

BME4103: BIO-SAFETY AND SECURITY

Effective Term

Semester B 2022/23

Part I Course Overview

Course Title

Bio-safety and Security

Subject Code

BME - Biomedical Engineering

Course Number

4103

Academic Unit

Biomedical Engineering (BME)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

MBE4103 Bio-safety and Security

Exclusive Courses

NIL

Part II Course Details

Abstract

Introduction to biosafety and biosecurity. Overview of the biosafety practices, equipment, and facilities for the safe and secure handling of dangerous pathogens in a laboratory setting. Related topics can be discussed, such as zoonoses and animal hazards; bloodborne pathogens; viral vectors; bioterrorism; food bio-safety; human pathogens and toxins.

Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the basic concepts of biosafety, biosecurity, bioterrorism, and food safety.	x		
2	Analyse relevant knowledge and technologies to obtain solutions for some common problems in detection and monitoring of bio-related hazards such as pathogens, toxins, and viruses.		x	
3	Integrate the principles of biosafety, biosecurity, bioterrorism, and food safety to analyse some practical problems.		x	x
4	Demonstrate reflective practice in an engineering context.		x	x

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

TLAs	Brief Description	CILO No.	Hours/week (if applicable)	
1	Lecture	Explain key concepts about various biosafety levels and hazardous conditions, laboratory safety and control.	1, 2, 3	3 hrs/12 weeks
2	Tutorial	To discuss some biosafety problems and questions as well as identify a group-based project.	1, 2, 3, 4	3 hrs/week for 1 week

3	Group-based Project	Students will have the opportunity to participate in the learning tasks of the mini-project activities. For the mini-project, a brief outline of the work topic(s), effective team work and expected report-writing will be provided emphasizing opportunities for discovery and innovation inherent in this student activity.	1, 2, 3, 4	
4	Laboratory Work	Group activities which involve various laboratory sessions related to Biosafety.	1, 4	3 hrs/week for 2 weeks

Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Mid-term Test	1, 2	10
2	Mini-project	2, 3, 4	20
3	Assignment	1, 2	10
4	Lab Report	3, 4	10

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

1.5

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for both coursework and examination should be obtained.

Assessment Rubrics (AR)**Assessment Task**

Mid-term Test

Criterion

Ability to Explain the basic concepts of biosafety and biosecurity.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Mini-project

Criterion

Capacity for Self-directed Learning to understand the principles, methodology and applications of bio-safety and control.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Assignment

Criterion

Ability to Explain the basic concepts of biosafety and biosecurity.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Lab Report

Criterion

Ability to Explain the methodology and procedures of various experimental works.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Examination

Criterion

Ability to Explain in Detail various issues and technical aspects of biosafety and biosecurity.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

- Biosafety: biological safety level
- Biosecurity: risk group
- Bioterrorism: biohazard and biomaterial
- Food biosafety: pathogens and toxins, viral vectors

Reading List

Compulsory Readings

Title	
1	Fleming, Diane O. and Hunt, Debra A., Biological Safety: Principles and Practices, Amer Society for Microbiology, 4th Edition, 2006.
2	Burnette, Ryan, Biosecurity: Understanding, Assessing, and Preventing the Threat, Wiley, 2013.

Additional Readings

Title	
1	Nil